

Solving Equations & Inequalities Practice

Name: Key

- Solve the following equations and inequalities.
- Graph the answer to any inequality.
- Check for extraneous solutions (no solutions).

1. $7x + 4 - 2x = 49$

$x = 9$

3. $7x = 3x - 80$

$x = -20$

5. $5 + 3(x - 2) = x + x - 13$

$x = -12$

7. $\frac{3}{4}\left(3x - \frac{1}{2}\right) - \frac{2}{3} = \frac{1}{3}$

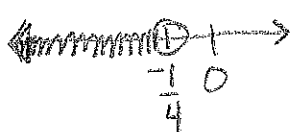
$x = \frac{11}{18}$

9. $\frac{2}{3} + 3y = 5y - \frac{2}{15}$

$y = \frac{2}{5}$

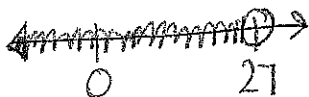
11. $-4x > 1$

$x < -\frac{1}{4}$



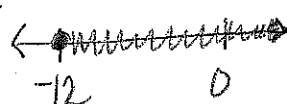
13. $\frac{2}{3}x - 4 < 14$

$x < 27$



15. $5(x + 3) - 2x \geq -21$

$x \geq -12$



2. $31 = 5 - 2(3x + 4) - x$

$x = -\frac{34}{7}$

4. $2(4c - 7) = 8c + 14$

no solution

6. $\frac{2}{3}(2x - 1) = 10$

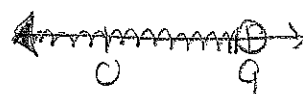
$x = 8$

8. $\frac{5}{3} + \frac{2}{3}x = \frac{25}{12} + \frac{5}{4}x + \frac{3}{4}$

$x = -2$

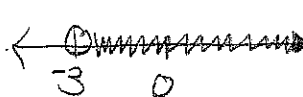
10. $\frac{2}{3}x < 6$

$x < 9$



12. $13 - 4x < 25$

$x > -3$



14. $-5x + 17 - 8x > 56$

$x < -3$



16. $2(x + 3) - 5(x - 1) > 32$

$x < -7$

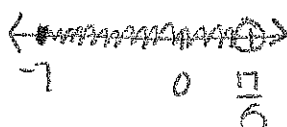


Key

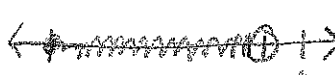
17. $4x \leq 37 + 4x$

all real solutions 

19. $4 - 5x > -13$ or $3 - x \leq 10$

$x < \frac{17}{5}$ $x \geq -7$ 

21. $15 < 6 - 10x \leq 37$

$-\frac{9}{10} > x \geq -\frac{31}{10}$ 

23. $|x + 3| = 19$

$x = 16$ $x = -22$

25. $|x| - 9 = 21$

$x = 30$ $x = -30$

27. $4 - |x - 1| = -5$

$x = 10$ $x = -8$

29. $|x - 3| > 8$

$x > 11$ OR $x < -5$

31. $|7x + 5| < -8$

no solution

33. $3|x + 8| > 42$

$x > 6$ OR $x < -22$

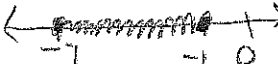
35. $5x + t = 17$ x

$x = \frac{17 - t}{5}$

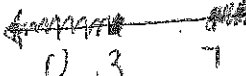
18. $5(9 - x) \leq 4(x + 18)$

$x \geq -3$ 

20. $-3 \leq 2x + 11 \leq 9$

$-7 \leq x \leq -1$ 

22. $3x - 4 \geq 17$ or $4x + 7 \leq 19$

$x \geq 7$ OR $x \leq 3$ 

24. $|5 - x| = 31$

$x = -26$ $x = 36$

26. $|2x + 3| - 5 = 17$

$x = \frac{19}{2}$ $x = -\frac{25}{2}$

28. $2|2x - 6| + 5 = 19$

$x = \frac{13}{2}$ $x = \frac{1}{2}$

30. $|2x + 15| < 11$

$x < -2$ $x > -13$

32. $5 + |x + 4| \geq 16$

$x \geq 7$ OR $x \leq -15$

34. $9 - |2x + 1| \leq 3$

$x \geq \frac{5}{2}$ $x \leq -\frac{7}{2}$

36. $2x = 4a + 2b$ a

$\frac{x - b}{2} = a$

Key

$$37. \frac{21w}{x} = 3 \cdot x$$

$$x = 7w$$

$$39. x + 3v = 9v \quad v$$

$$v = \frac{x}{6}$$

$$41. A = \frac{1}{2}ah - \frac{1}{2}bh \quad b$$

$$b = \frac{-2A + ah}{h} \text{ or } b = \frac{2A + ah}{-h}$$

$$43. \sqrt{x} + 9 = 25$$

$$x = 256$$

$$45. \sqrt{x-5} + 3 = 10$$

$$x = 54$$

$$47. \sqrt{x+2} + 12 = 7$$

no solution ($x = 23$)

Solve using any method but make sure you understand each method.

$$49. \begin{aligned} 3x - y &= 5 \\ 2x + y &= 15 \end{aligned}$$

$$(4, 7)$$

$$51. \begin{aligned} 5x - y &= 22 \\ 5x + 4y &= -63 \end{aligned}$$

$$(1, -17)$$

$$53. \begin{aligned} 3x - 5y &= -29 \\ 2x - 10y &= -42 \end{aligned}$$

$$(-4, \frac{17}{5})$$

$$38. pcx = 2p + 7 \quad p$$

$$p = \frac{7}{cx-2}$$

$$40. ax - b = k \quad b$$

$$b = -k + ax$$

$$42. Q = 3a + 5ca \quad a$$

$$a = \frac{Q}{3+5c}$$

$$44. \sqrt{3x+4} = 5$$

$$x = 7$$

$$46. 13 - \sqrt{x-1} = 22$$

no solution ($x = 82$)

$$48. 5 - \sqrt{x} = 2$$

$$x = 9$$

$$50. \begin{aligned} 3x + 5y &= 17 \\ 2x + 3y &= 11 \end{aligned}$$

$$(4, 1)$$

$$52. \begin{aligned} 4x - 5y &= -19 \\ 3x + 7y &= 18 \end{aligned}$$

$$(-1, 3)$$

$$54. \begin{aligned} 4x + y &= 42 \\ 6x - 5y &= 50 \end{aligned}$$

$$(10, 2)$$

Key

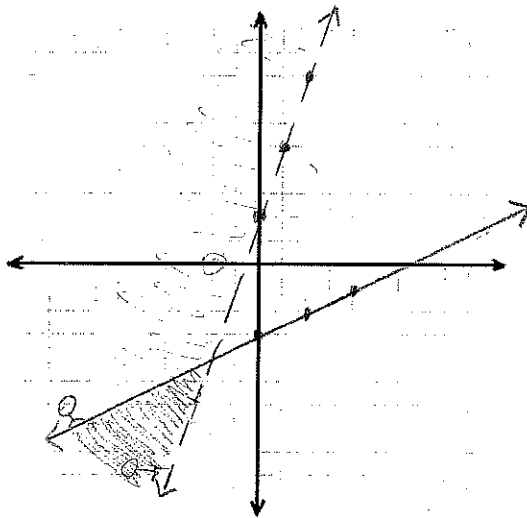
55. The difference of two numbers is 12. One fourth of the larger number plus on half the smaller number is 9. Find the numbers.

$$\begin{array}{lcl} X = \# & X - y = 12 & X = 20 \\ y = \# & \frac{1}{4}X + \frac{1}{2}y = 9 & y = 8 \end{array}$$

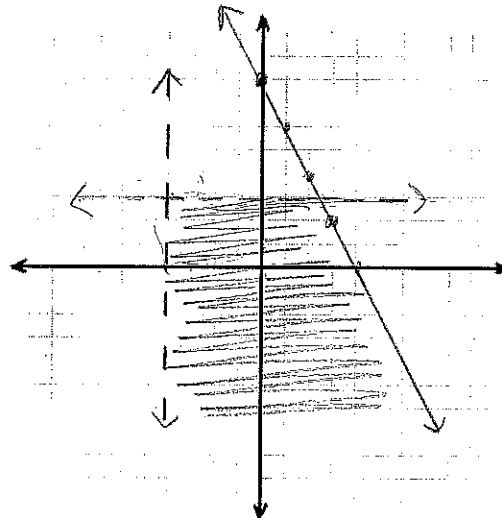
56. A motorboat traveled for 2 hours with an 8 km/h current. The return trip against the same current took 3 hours. Find the speed of the motorboat in still water.

$$\begin{array}{lcl} X = \text{speed boat} & X + 8 = \frac{y}{2} & X = 40 \text{ km/h} \\ y = \text{trip in km} & X - 8 = \frac{y}{3} & \end{array}$$

57. Graph:
 $y > 3x + 2$
 $y \leq \frac{1}{2}x - 3$



58. Graph:
 $x > -4$
 $y \leq -2x + 8$



$$1. 7x + 4 - 2x = 49$$

$$5x + 4 = 49$$

$$5x = 45$$

$$\boxed{x=9}$$

$$2. 31 = 5 - 2(3x + 4) - x$$

$$31 = 5 - 6x - 8 - x$$

$$31 = -3 - 7x$$

$$\frac{34}{-7} = \frac{-7x}{-7}$$

$$\boxed{\frac{34}{-7} = x}$$

$$3. 7x = 3x - 80$$

$$4x = -80$$

$$\boxed{x = -20}$$

$$4. 2(4c - 7) = 8c + 14$$

$$8c - 14 = 8c + 14$$

$$-14 = 14$$

$$\boxed{\text{no solution}}$$

$$5. 5 + 3(x - 2) = x + x - 13$$

$$5 + 3x - 6 = 2x - 13$$

$$3x - 1 = 2x - 13$$

$$\boxed{x = -12}$$

$$6. \left[\frac{2}{3} (2x - 1) = 10 \right] \frac{3}{2}$$

$$2x - 1 = 15$$

$$2x = 16$$

$$\boxed{x = 8}$$

$$7. \left[\frac{3}{4} (3x - \frac{1}{2}) - \frac{2}{3} = \frac{1}{3} \right] \frac{12}{1}$$

$$\frac{36}{4} (3x - \frac{1}{2}) - \frac{24}{3} = \frac{12}{3}$$

$$9(3x - \frac{1}{2}) - 8 = 4$$

$$[27x - \frac{9}{2} = 12] \frac{2}{1}$$

$$54x - 9 = 24$$

$$54x = 33$$

$$x = \frac{33}{54}$$

$$\boxed{x = \frac{11}{18}}$$

$$8. \left[\frac{5}{3} + \frac{2}{3}x = \frac{25}{12} + \frac{5}{4}x + \frac{3}{4} \right] \frac{12}{1}$$

$$\frac{60}{3} + \frac{24}{3}x = 25 + \frac{60}{4}x + \frac{36}{4}$$

$$20 + 8x = 25 + 15x + 9$$

$$20 + 8x = 34 + 15x$$

$$-14 = 7x$$

$$\boxed{-2 = x}$$

$$9. \left[\frac{2}{3} + 3y = 5y - \frac{2}{15} \right] \frac{15}{1}$$

$$\frac{30}{3} + 45y = 75y - \frac{30}{15}$$

$$10 + 45y = 75y - 2$$

$$12 = 30y$$

$$\frac{12}{30} = y$$

$$\boxed{\frac{2}{5} = y}$$

$$10. \frac{2}{3}x < 6$$

$$x < \frac{18}{2}$$

$$\boxed{x < 9}$$

$$11. -4x > 1$$

$$\boxed{x < -\frac{1}{4}}$$

$$12. 13 - 4x < 25$$

$$-4x < 12$$

$$\boxed{x > -3}$$

$$13. \frac{2}{3}x - 4 < 14$$

$$\frac{2}{3}x < 18$$

$$\boxed{x < 27}$$

$$14. -5x + 17 - 8x > 56$$

$$-13x + 17 > 56$$

$$-13x > 39$$

$$\boxed{x < -3}$$

$$15. 5(x + 3) - 2x \geq -21$$

$$5x + 15 - 2x \geq -21$$

$$3x + 15 \geq -21$$

$$3x \geq -36$$

$$\boxed{x \geq -12}$$

key

$$16. 2(x+3) - 5(x-1) > 32$$

$$2x + 6 - 5x + 5 > 32$$

$$-3x + 11 > 32$$

$$-3x > 21$$

$$x < -7$$

$$17. 4x \leq 37 + 4x$$

$$0 \leq 37$$

all real solutions

$$18. 5(9-x) \leq 4(x+8)$$

$$45 - 5x \leq 4x + 32$$

$$-9x \leq 27$$

$$x \geq -3$$

$$19. 4 - 5x > -13 \text{ or } 3 - x \leq 10$$

$$-5x > -17 \quad -x \leq 7$$

$$x < \frac{17}{5} \text{ or } x \geq -7$$

$$20. -3 \leq 2x + 11 \leq 9$$

$$-11 \quad -11 \quad -11$$

$$-14 \leq 2x \leq -2$$

$$-7 \leq x \leq -1$$

$$21. 15 < 6 - 10x \leq 37$$

$$-6 \quad -6 \quad -6$$

$$9 < -10x \leq 31$$

$$\frac{-9}{-10} < \frac{-31}{-10}$$

$$0.9 > x \geq \frac{31}{10}$$

$$22. 3x - 4 \geq 17 \text{ or } 4x + 7 \leq 19$$

$$3x \geq 21 \quad 4x \leq 12$$

$$x \geq 7 \text{ or } x \leq 3$$

$$23. |x+3| = 19$$

$$x+3 = 19 \quad x+3 = -19$$

$$x = 16 \quad x = -22$$

$$24. |5-x| = 31$$

$$5-x = 31 \quad 5-x = -31$$

$$-x = 26 \quad -x = -36$$

$$x = -26 \quad x = 36$$

$$25. |x| - 9 = 21$$

$$|x| = 30$$

$$x = 30 \quad x = -30$$

$$26. |2x+3| - 5 = 17$$

$$|2x+3| = 22$$

$$2x+3 = 22 \quad 2x+3 = -22$$

$$2x = 19 \quad 2x = -25$$

$$x = \frac{19}{2} \quad x = -\frac{25}{2}$$

$$27. 4 - |x-1| = -5$$

$$-|x-1| = -9$$

$$|x-1| = 9$$

$$x-1 = 9 \quad x-1 = -9$$

$$x = 10 \quad x = -8$$

$$28. 2|2x-6| + 5 = 19$$

$$2|2x-6| = 14$$

$$|2x-6| = 7$$

$$2x-6 = 7 \quad 2x-6 = -7$$

$$2x = 13 \quad 2x = -1$$

$$x = \frac{13}{2} \quad x = -\frac{1}{2}$$

$$29. |x-3| > 8$$

$$x-3 > 8 \quad x-3 < -8$$

$$x > 11 \text{ or } x < -5$$

$$30. |2x+15| < 11$$

$$2x+15 < 11 \quad 2x+15 > -11$$

$$2x < -4 \quad 2x > -26$$

$$x < -2 \quad x > -13$$

$$31. |7x+5| \leq -8$$

no solution

$$32. 5 + |x+4| \geq 16$$

$$|x+4| \geq 11$$

$$x+4 \geq 11 \quad x+4 \leq -11$$

$$x \geq 7 \text{ or } x \leq -15$$

$$33. 3|x+8| > 42$$

$$|x+8| > 14$$

$$x+8 > 14 \quad x+8 < -14$$

$$x > 6 \text{ or } x < -22$$

$$34. -9 - |2x+1| \leq 3$$

$$-|2x+1| \leq -6$$

$$|2x+1| \geq 6$$

$$2x+1 \geq 6 \quad 2x+1 \leq -6$$

$$2x \geq 5 \quad 2x \leq -7$$

$$\boxed{x \geq \frac{5}{2} \quad x \leq -\frac{7}{2}}$$

$$35. 5x+t=17 \quad (*)$$

$$5x = 17-t$$

$$\boxed{x = \frac{17-t}{5}}$$

$$36. 2x = 4a + 2b \quad (a)$$

$$\frac{2x-2b}{4} = \frac{4a}{4}$$

$$\boxed{\frac{x-b}{2} = a}$$

$$37. \frac{21w}{x} = 3 \quad (*)$$

$$\frac{21w}{3} = \frac{3x}{3}$$

$$\boxed{7w = x}$$

$$38. pcx = 2p+7$$

$$pcx - 2p = 7$$

$$\frac{p(cx-2)}{cx-2} = \frac{7}{cx-2}$$

$$\boxed{p = \frac{7}{cx-2}}$$

$$39. x+3v=9v$$

$$\frac{x}{6} = \frac{6v}{6} \quad (v)$$

$$\boxed{\frac{x}{6} = v}$$

$$40. ax-b=4 \quad (b)$$

$$-b = 4 - ax$$

$$\boxed{b = -4 + ax}$$

$$41. A = \frac{1}{2}ah - \frac{1}{2}bh$$

$$A - \frac{1}{2}ah = -\frac{1}{2}bh \quad \rightarrow$$

$$-2A + ah = bh$$

$$\frac{-2A + ah}{h} = b \quad \text{or} \quad \frac{2A - ah}{-h} = b$$

$$42. Q = 3a + 5ca \quad (a)$$

$$Q = a(3+5c)$$

$$\boxed{\frac{Q}{3+5c} = a}$$

$$43. \sqrt{x} + 9 = 25$$

$$\sqrt{x} = 16$$

$$\boxed{x = 256}$$

$$44. \sqrt{3x+4} = 5$$

$$3x+4 = 25$$

$$3x = 21$$

$$\boxed{x = 7}$$

$$45. \sqrt{x-5} + 3 = 10 \quad \text{Key}$$

$$\sqrt{x-5} = 7$$

$$x-5 = 49$$

$$\boxed{x = 54}$$

$$46. 13 - \sqrt{x-1} = 22$$

$$-\sqrt{x-1} = 9$$

$$\sqrt{x-1} = -9$$

$$x-1 = 81$$

$$x = 82 \quad \boxed{\text{no solution}}$$

$$47. \sqrt{x+2} + 12 = 7$$

$$\sqrt{x+2} = -5$$

$$x+2 = 25$$

$$x = 23 \quad \boxed{\text{no solution}}$$

$$48. 5 - \sqrt{x} = 2$$

$$-\sqrt{x} = -3$$

$$\sqrt{x} = 3$$

$$\boxed{x = 9}$$

$$49. 3x - y = 5$$

$$2x + y = 15$$

$$y = 15 - 2x$$

$$3x - (15 - 2x) = 5$$

$$3x - 15 + 2x = 5$$

$$5x = 20$$

$$x = 4$$

$$\boxed{(4, 7)}$$

$$y = 15 - 2(4)$$

$$y = 15 - 8$$

$$y = 7$$

$$50. \begin{cases} 3x + 5y = 17 & \times 2 \\ 2x + 3y = 11 & \times 3 \end{cases}$$

$$-6x - 10y = -34$$

$$6x + 9y = 33$$

$$-y = -1$$

$$y = 1$$

$$(4, 1)$$

$$3x + 5(1) = 17$$

$$3x = 12$$

$$x = 4$$

$$51. \begin{cases} 5x - y = 22 & \times 4 \\ 5x + 4y = -63 \end{cases}$$

$$20x - 4y = 88$$

$$25x = 25$$

$$x = 1$$

$$(1, -17)$$

$$5(1) + 4y = -63$$

$$4y = -68$$

$$y = -17$$

$$52. \begin{cases} 4x - 5y = -19 & \times 3 \\ 3x + 7y = 18 & \times 4 \end{cases}$$

$$12x - 15y = -57$$

$$12x + 28y = 72$$

$$43y = 129$$

$$y = 3$$

$$4x - 5(3) = -19$$

$$4x = -4 \quad x = -1$$

$$(-1, 3)$$

$$53. \begin{cases} 3x - 5y = -29 & \times 2 \\ 2x - 10y = -42 \end{cases}$$

$$-6x + 10y = 58$$

$$-4x = 16$$

$$x = -4$$

$$(-4, 17/5)$$

$$3(-4) - 5y = -29$$

$$-5y = -17$$

$$y = 17/5$$

$$54. \begin{cases} 4x + y = 42 \\ 6x - 5y = 50 \end{cases}$$

$$y = 42 - 4x$$

$$6x - 5(42 - 4x) = 50$$

$$6x - 210 + 20x = 50$$

$$26x = 260$$

$$x = 10$$

$$(10, 2)$$

$$y = 42 - 4(10)$$

$$y = 2$$

$$55. \begin{cases} x = 12 + y \\ x - y = 12 \end{cases}$$

$$x - y = 12$$

$$\frac{1}{4}x + \frac{1}{2}y = 9$$

$$x = 12 + y \quad x = 12 + 8$$

$$\frac{1}{4}(12 + y) + \frac{1}{2}y = 9 \quad x = 20$$

$$3 + \frac{1}{4}y + \frac{1}{2}y = 9 \quad (20, 8)$$

$$12 + y + 2y = 36$$

$$3y = 24$$

$$y = 8$$

56.

Key

x = motorboat speed

y = trip in km

$$m + 8 = \frac{t}{2}$$

$$m - 8 = \frac{t}{3}$$

$$2m + 16 = t$$

$$3m - 24 = t$$

$$2m + 16 = 3m - 24$$

$$40 = m$$

Speed is 40 km/h